Press Release

Taking AIM on single-use plastics: metal 3D printed tooling solution designed to change the world… one paper cup at a time

An innovative Swedish company has used its expertise in applying electron beam melting technology to develop a new tooling concept for production of next generation molded fiber containers

Cincinnati, OH, December 07, 2020 – As pulp and paper manufacturers bid to replace single-use plastic packaging to help clean up our planet, the team at AIM Sweden AB (AIM), the commercial spin-off from the Mid Sweden University, has developed new methods for modelling, as well as 3D printing an entirely new tooling concept that is currently being introduced in the manufacture of molded paper food and drink containers.

Already active and experienced in the manufacture of metal and plastic orthopedic and industrial components, over the past five years AIM Sweden has been using its three GE Additive Arcam EBM Q20plus and Q10plus systems to develop cutting-edge 3D printed perforated molds that address the unique challenges of turning wet, fibrous pulp into products such as food containers and packaging material with improved strength, thinner walls and the ability to contain liquids and fats.

Innovation for sustainability

This work, to develop new 3D printed tooling concepts as well as methods to model and produce them has piqued the interest of the pulp and packaging industry as it is looking for new ways to help solve wider environmental challenges with new solutions. It also comes as consumer attitudes steer consumption habits in a more sustainable direction and governments increasingly look to regulation to help clean up our environment.

The EU's Directive on Single-Use plastics[1], for example, sets ambitious targets on decreasing the use of disposable plastic products in Europe. By mid-2021, European Member States will need to have banned single use plastic products for which there are readily available alternatives. This includes cutlery, plates and expanded polystyrene food containers, beverage containers and cups. By 2026 Member States also have an obligation to show an ambitious and sustained reduction in the consumption of plastic food containers and cups and lids for beverages[2].

[1] https://ec.europa.eu/environment/waste/plastic_waste.htm

[2] https://rethinkplasticalliance.eu/wp-content/uploads/2019/05/ZWE_Unfolding-the-SUP-directive.pdf

With the support of GE Additive, whose EBM additive manufacturing machines produce the molds, AIM Sweden's new technology has the potential to be a game changer in the consumer goods packaging industry for cost, quality and sustainability reasons.

EBM technology replaces conventional manufacturing methods

In today's manufacturing process of molded fiber products, it's necessary to frequently stop the production line for maintenance. Take, for example, the tools needed to produce common egg trays, a simple molded fiber product.

A vacuum is applied to a porous shaping tool to drain water and collect fibers on one side of the mold. The fibers are then lifted off and dried as the final product. However, conventional forming tools easily clog, requiring frequent cleaning and/or repair, leading to significant production downtime.

In addition, producing the conventional molds requires a significant amount of manual operations and workmanship as a wire mesh is manually attached to a 3D-shaped metal base by sewing and soldering. This process is time consuming, expensive and offers no opportunity to optimize the draining properties differently in different areas of the tool.

AIM Sweden's new shaping tools, additively manufactured using GE Additive's EBM technology, solve these issues, making them cheaper, more efficient and with a longer life expectancy, explains AIM's technical director Axel Bergström, "this all started out with a few customers asking us to make forming tools for molded fiber. The early molds were fully functional, but we were also challenged to improve the functionality by increasing resolution and make even smaller perforation holes more evenly distributed."

"To increase the resolution of perforation across a complex 3D surface was a geometric challenge that pushed the limits of current additive printing technology and knowhow. The GE Additive team in Gothenburg provided an advanced training course which was instrumental for the process development work we later carried out. Now, we can utilize our EBM machines more efficiently and build high resolution titanium skins more or less free of support," Bergström continued.

The collaboration has allowed AIM Sweden to develop a completely new tooling solution as well as an optimized EBM build strategy to produce extremely thin, highly stackable molds with minimal or no support structures, reducing production time significantly. In operation the thin titanium forming skins rest on a 3D printed nylon backing, also designed and produced by AIM Sweden.

But this is only the beginning. These molds now make it viable to design and optimize porosity on a hole by hole basis, including position, size, shape and angle at a consistent quality, allowing molded fiber to be used in ways never thought possible.

By controlling the resolution of porosity, molded fiber products can be made thinner, stronger and more refined than before making them suitable for a range of new uses such as pressurized drink containers and durable food vessels which are currently created using plastics.

Changing the world one paper cup at a time

Currently, the world produces more than 300 million tons of plastic every year and this is expected to double again over the next 20 years. Plastic packaging is the largest application, currently representing 26% of the total volume of plastics used.

50% of this is for single-use purposes – utilized for just a few moments, but on the planet for at least several hundred years. More than eight million tons of plastic is dumped into our oceans every year[3][4][5]. Research has predicted that unless we severely curtail plastic production and dumping, by 2050 the mass of plastic in our oceans will exceed the mass of fish[6].

Fiber based products are being looked at as a real alternative as they are based on renewable raw materials, are recyclable, and can be composted, therefore do not end up littering the marine environment. However, to date, they have not been able to deliver the rigidity, impermeability and cost competitiveness of their plastic counterparts. AIM Sweden´s technology closes that gap.

“EBM like most additive technologies is an inherently sustainable and energy efficient process that, compared to conventional techniques, cuts down on waste by only using the materials needed. It’s great to see how EBM has been a cornerstone of AIM Sweden’s strategic vision. Their team has a solid business model and purpose – so it’s been no surprise that this new solution has garnered interest from the major pulp and paper players here in the Nordic region and further afield,” said Eva Karlsson, general manager, GE Additive Arcam EBM.

“Imagine if we could change all the coffee cups in the world to be made from renewable cellulose fibers,” ponders Stefan Thundal, chief commercial officer at AIM Sweden.

[3] https://ourworldindata.org/plastic-pollution

[4] https://plasticoceans.org/the-facts/

[5] http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf

[6] https://www.theguardian.com/business/2016/jan/19/more-plastic-than-fish-in-the-sea-by-2050-warns-ellen-macarthur

"Until now this has been a bit of a pipe dream, but we have more and more evidence that our additive manufactured tools for molded fiber products have significant advantages over traditional tooling. With our solution we also see the opportunity to retrofit existing production lines with 3D printed forming tools, reaching a broader range of customers. And coffee cups would just be the start. Every little bit helps us all become more sustainable."

This power of inspiration has been the catalyst for AIM Sweden's researchers and engineers, tapping into GE Additive's expertise, to reimagine how the future of manufacturing might work for the good of the planet.

About GE Additive
GE Additive – part of GE (NYSE: GE) is a world leader in additive design and manufacturing, a pioneering process that has the power and potential to transform businesses. Through our integrated offering of additive experts, advanced machines and quality materials, we empower our customers to build innovative new products. Products that solve manufacturing challenges, improve business outcomes and help change the world for the better. GE Additive includes additive machine providers Concept Laser and Arcam EBM; along with additive material provider AP&C.

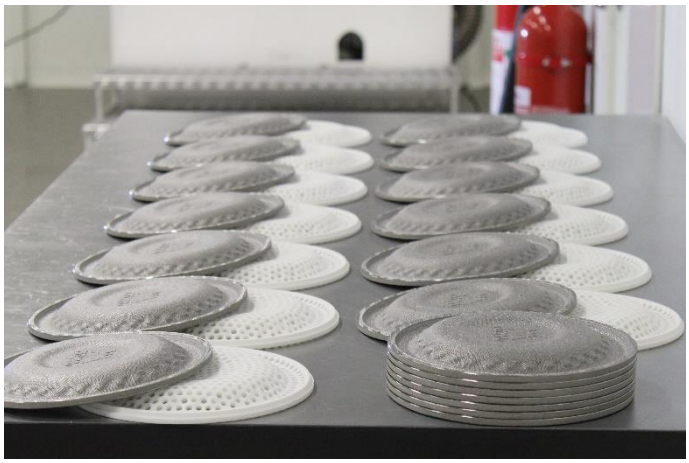
About AIM Sweden
Aim Sweden AB is the commercial arm of AIR Sweden AB, an additive research group based at the Mid Sweden University in Östersund, Sweden. AIM Sweden AB is a manufacturer of Medical and Industrial components in metal and plastics using additive manufacturing, also known as 3D printing. We offer our customers unprecedented flexibility in the design and manufacturing of components in polymers and metals using additive manufacturing technology such as Electron Beam Melting (EBM) and Selective Laser Sintering (SLS) for industry, biomedicine and medical technology application. High precision, better quality, lower cost and speed of design of implants are some of the benefits found in the technology.

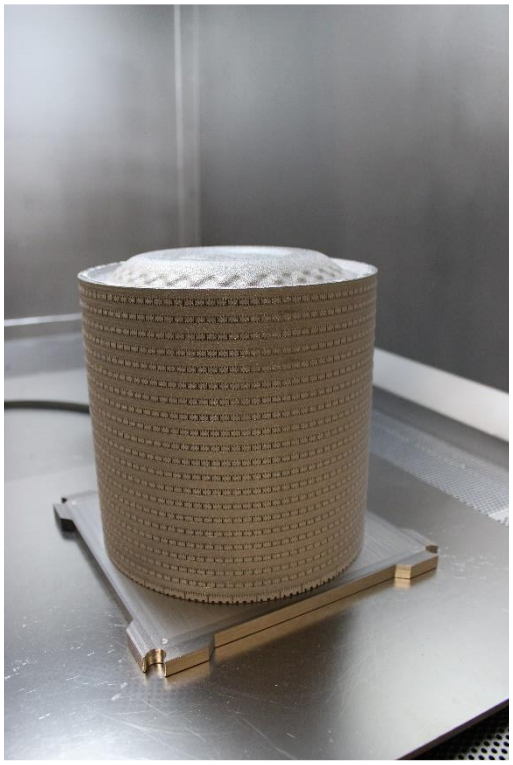
Media Relations Contact
Shaun Wootton, GE Additive
+44 7557 489113
shaun.wootton@ge.com

Press Contact
Siria Nielsen – EMG for GE Additive
+31 164 317 036
snielsen@emg-marcom.com

3D printed tooling solution.
(Photo: AIM Sweden, GEADPR046)


Cup Tool Line.
(Photo: AIM Sweden, GEADPR046)


One build many tools.
(Photo: AIM Sweden, GEADPR046)



Efficient stacking for cost efficiency.
(Photo: AIM Sweden, GEADPR046)

AIM Sweden logo.
(Photo: AIM Sweden, GEADPR046)

This press release and relevant photography can be downloaded from www.PressReleaseFinder.com.
Alternatively for very high resolution pictures please contact
Siria Nielsen (snielsen@emg-marcom.com, +31 164 317 036).